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(54) Clamp for holding logs during the production of toilet paper rolls or the like

Spannvorrichtung zur Halterung von Rollen während der Herstellung von Toilettenpapierrollen oder dergleichen

Dispositif de serrage pour rouleaux pendant la production de rouleaux de papier de toilette ou de produits similaires

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(56) References cited:
EP-A- 0 526 412

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Description

BACKGROUND OF THE INVENTION

The invention refers to an improvement to a device for supporting and restraining a log of paper in a machine for cutting the logs into shorter rolls of toilet paper, kitchen towels (all-purpose wipers) and the like, according to the preamble of claim 1. The invention also relates to a log cutting machine including said device. The machine for cutting logs into shorter rolls is often referred to as a "log saw" and includes a cutting blade which moves through a cutting plane as it cuts the logs. A device of the prior art is disclosed in European Patent Appl. 0526412, which corresponds to U.S. Application Serial No. 07/915,945. This known device, which can be provided for machines processing a single log, or, simultaneously, more than two or more logs in parallel array, can be quickly adapted to logs of different diameters. It includes, for each log:

- a) a clamp on both sides of the cutting plane;
- b) a pair of yielding and symmetrically arcuate strips, secured to relevant supports and with movable end portions, said strips tending to expand outwardly;
- c) a strap anchored to a retention holder and to an adjustment holder, and surrounding said pair of strips so as to vary their geometry in relation to the diameter of the logs being processed, the strap encircling approximately half of the log to be cut;
- d) two oscillating cradles adjacent to the supports, which cradles conform to the configuration of the strips as the geometry of the strips change; and
- e) an appendix fixed to each oscillating cradle and associated to each strip, to cooperate with adjustment and locking means.

The invention allows an easier and more accurate adjustment than that obtained by the above-mentioned known device.

BRIEF DESCRIPTION OF THE INVENTION

Substantially, the device according to the present invention, which is defined in claim 1, comprises a single drive (especially of mechanical type) to simultaneously obtain both the adjustment of the position of the adjustment holder(s) of the strap(s) and the symmetrical angular movement of the two appendixes and, consequently, of the two cradles. The device further includes an angularly movable actuating member and two connecting rods articulated to eccentric pins at diametrically opposite positions of said angularly movable actuating member. The two connecting rods are engaged to the two appendixes of the oscillating cradles, respectively, to cause symmetrical and simultaneous angular movement of said two appendixes and,

consequently, of the two cradles. A drive is also connected to the actuating member to operate the adjustment holder of the strap which surrounds a pair of strips.

Said drive may comprise means for adjusting the mutual angular position of the actuating member and an angularly movable member carrying the adjustment holder of the strap. In the drive, provision may be made for an endless, flexible, chain-like timing-belt member or the like, to operate said angularly movable member, which has the shape of a rotor. The strap is partly wound around the angularly movable member which carries the adjustment holder. Two length-adjusting members are provided on the flexible member and can be moved in opposite directions for timing adjustment.

In an apparatus including multiple seats for cutting more than one log at a time, with logs arranged side-by-side and simultaneously cut, provision may be made for bars articulated to the connecting rods, each bar being connected to at least two rods which must be operated simultaneously and in the same direction by the actuating member. In this case, two straps, able to act on the two pairs of cooperating strips arranged side-by-side, may be coupled and engaged to the same holder to be simultaneously operated.

DETAILED DESCRIPTION

The invention will be better understood by following the description and the attached drawing, which shows a practical, not limiting example, of the same invention relevant to a machine capable of simultaneously processing two logs or rolls arranged side-by-side. In the drawing, where like characters indicate like parts:

Fig. 1 shows a vertical section taken transversely to the direction of advancement of the rolls or logs, substantially on line I-I of Fig. 2.

Fig. 2 shows a horizontal section substantially taken on line II-II of Fig. 1.

Fig. 3 shows an end view along line III-III of Fig. 1.

Fig. 4 shows an enlarged detail of one clamp device.

In Fig. 1, two clamp devices are shown which are arranged on two parallel log advancing paths. The two devices are shown in two different geometric conditions. The left-hand clamp device is placed in a position suitable for clamping logs of small diameter, while the right-hand clamp device is shown in the position suitable for clamping logs of large diameter. During normal use, the two side-by-side clamp devices work on logs of the same diameter.

Numeral 201 indicates the supporting frame of the clamping device, and T denotes, in Figs. 2 and 3, the cutting plane. Numeral 203 in Fig. 1 indicates the pushers which advance the logs. The pushers are carried by an endless flexible member 205 (e.g., a belt or chain). Numerals 207 and 209 indicate external and intermedi-

ate supports, respectively. Fixed to supports 207 and 209, by means of clamps 212A and 214A, are flexible strips 212 and 214. The strips 212 and 214 are in a substantially circular hoop-shaped form to create a passage through which a log B may move. The strips 212 and 214 may be made of polycarbonate or other material having low coefficient of friction and tend to spread apart so that logs B may slide within and along said strips. However, the strips can be drawn together to clasp the log and thus can exert a limited pressure on the surface of the logs and support the log against the thrusts which the blade exerts onto the log during cutting, thereby avoiding undesired lateral displacements of said log.

Fastened at pivot-axis 216 to the supports 207 and 209 are symmetrically shaped blocks which form oscillating cradles 218 on which the lower ends of the strips 212 and 214 may rest. The oscillating cradles 218 must be able to assume different angular positions according to the diameter of the logs B to be cut, and to this end they can be pivoted about the respective axis 216.

Surrounding each pair of strips 212, 214 is a respective strap 222. One end of each strap 222 is anchored to a holder 224A connected to an actuator 224 which acts as a pneumatic piston which is capable of extending and thus releasing the strap in order to facilitate the insertion of a roll or log between the strips 212, 214. The opposite ends of the two straps 222 move in the direction of the double arrow fx (Fig. 1) to vary the geometry of (i.e., the size of the opening created by) the strips 212, 214 to accommodate the diameter of the logs to be cut. Any adjustment of the straps 222 according to arrow fx is accompanied by a corresponding and symmetrical angular adjustment of the cradles 218.

A single drive adjusts both the cradles 218 and the straps 222.

Fixed to each oscillating cradle 218 is a rod. Figure 1 shows rod 228A which is inclined downwards and to the left, and rod 228B which is inclined downwards and to the right. Two pairs of rods 228A and 228B are shown in Figure 1 for the symmetrical adjustment of the two pairs of cradles 218.

The two rods 228A, lying substantially on the same vertical plane and inclined parallel to each other, are connected at their lower ends 230A to a substantially horizontal bar 232A which is carried by said rods 228A. The bar 232A is engaged, through an articulated joint, to a connecting rod 236A whose crankpin 238A is eccentrically fixed to an actuating member 240 which rotates with a shaft 242. The two rods 228A are connected at their lower ends 230B to a bar 232B (similar to 232A), which is connected by an articulated joint 234B to a connecting rod 236B whose crankpin 238B is also fixed to the actuating member 240 diametrically opposite the crankpin 238A.

An angular and suitably limited displacement of the actuating member 240 causes equal and opposite movements of the two bars 232A and 232B and thereby

a corresponding angular displacement of the rods 228A and 228B, respectively. The displacement is symmetrical to vertical planes passing through the axes of the respective cradles (and, therefore, of the logs B supported in the cradles). The angular displacements of the rods 228A and 228B cause the displacements of cradles 218 and places them in a correct angular position to support the strips 212 and 214.

Correspondingly, the two straps 222 must be moved (according to double arrow fx) in order to change the diameter of the circle defined by the two strips 212, 214. To this end, the two straps 222 (lying with their centerline in the same transversal plane) are joined and simultaneously fed around a pulley 244, and connected to a rotor 248 by means of an adjustable clamp 246. This rotor 248 is supported on a shaft 250 which is parallel to the shaft 242 and arranged beneath the latter. The two shafts 242, 250 must be operated simultaneously and rotated to the same degree so as to simultaneously vary the angle of inclination of rods 228A, 228B, as well as the position of the cradles 218 and the extension of the straps 222.

For the above purpose, a single drive means, which is operated either manually through a handwheel 252 or by servomotor (not shown), rotates a drive shaft 254 horizontally mounted on frame 201. The drive shaft 254 is connected to a chain drive 256 provided with a suitable stretcher 258, to operate a gear reduction box, generally shown at 260, which causes the shaft 242 to rotate. Another chain drive 262 passes around a chain wheel 264 (keyed on shaft 242) and onto a chain wheel 266 (keyed on shaft 250). There is a transmission ratio of 1:1 between the shafts 242 and 250.

The shafts 242 and 250 perform relatively limited rotations and, therefore, the chain 262 driven around chain wheels 264 and 266 also performs limited movements. On the two sections of chain extending between the two wheels 264 and 266, there are provided two length-adjusting members 270 which include suitably-threaded stems engaging into a threaded sleeve. The latter is rotatable relative to the stems in such a way that each of the two length-adjusting members 270 can be operated to change the length thereof and, correspondingly, to move the two portions of chain (which are anchored to each of said length-adjusting members) close to or away from each other. By turning these members 270 in opposite directions one of them is lengthened and the other is shortened. This enables the timing between the shafts 242 and 250 to be easily adjusted and the machine registered to achieve corresponding, simultaneous variations in the position of both the cradles 218 and the straps 222 for obtaining a corresponding change of the geometry of the pairs of cooperating strips 212, 214 as may be needed to accommodate logs of different diameters.

As shown in the drawing, to achieve a firm retention of the logs during cutting thereof by a circular blade (not shown) acting in the cutting plane T, two clamps are pro-

vided for each log. Each clamp includes a pair of strips 212 and 214, the respective cradles 218 and the respective strap 222. One such clamp is arranged on each side of the cutting plane T. When two parallel logs are cut simultaneously, two pairs of straps 222, which must be operated simultaneously, and two systems for adjusting the inclination of rods 228A and 228B associated to each one of the two clamping units made up of the strips, straps and cradles, are provided.

This is achieved by means of co-axial pulleys 244 or by a single roller located in alignment with the downwardly extending portions of the pairs of straps.

On the shaft 250, a rotor 248 is provided which axially extends to engage the two pairs of straps by means of two relevant clamps 246. Since the straps are extremely thin (steel laminae), the variation in diameter is negligible.

On the shaft 242 are two actuating members 240 carrying crankpins 238A and 238B to operate the connecting rods 236A, 236B and the bars 232A and 232B for the corresponding rods of the two clamping units. The two clamping units are clearly shown in Fig. 3, and the respective drive systems comprising the connecting rods 236A and 236B are shown in Fig. 2. All these systems are operated simultaneously by a simple action of the drive shaft 254, according to the diameter of the logs being cut. The timing of the two shafts 242, 250, accomplished through the adjustment members 270, makes it possible to set the angular displacement of the rods 228A and 228B and thus the position of the straps 222 in the direction of the double arrow fx.

During processing of a single log B, the latter is advanced through the passage defined by the pairs of strips 212 and 214. During subsequent advancement steps of the log the strap 222 is not slackened. The low coefficient of friction of strips 212, 214 permits the sliding of the log even when a slight radial force is exerted thereon. Any slight variation of the log diameter can be accommodated by the pneumatic piston 224. The operator can change the extension of the strap 222 and the position of the cradles 218 (and consequently the position of the strips 212, 214) by means of rotation of shaft 254 only when the cutting machine has to be adapted in order to process logs of a new, different diameter. In that case, an angular displacement of the single shaft 254 performs all the necessary adjustments.

It is understood that the drawing shows an exemplification given only as a practical demonstration of the invention, as this may vary in the forms and dispositions without, nevertheless, coming out from the scope of the invention as defined by the claims. The presence of reference numbers in the appended claims has the purpose of facilitating the reading of the claims, reference being made to the description and the drawing, and does not limit the scope of the protection represented by the claims.

Claims

1. A clamping device for the retention of a log adjacent to the cutting plane in a log cutting machine, the clamping device being quickly adaptable to logs of different diameters while the cutting machine is operating, said clamping device including for each log and on each side of the cutting plane (T-T):

- a pair of yielding arcuate strips (212, 214) each having a first end fastened to a pertaining support (207, 209) and a respective second free end, each strip being curved between its fixed end and its free end in such a manner that the strips together define a passage through which a log can move;
- a strap (222) partly surrounding said strips and extending around a portion thereof opposed to the fixed ends of said strips (212, 214), one end of the strap being anchored to a retention holder, the other end of the strap being fastened to an adjustment holder, the adjustment holder being movable for tightening respectively loosening the strap to adapt the geometry of the strips to the diameter of the log being processed, said strap (222) extending around approximately half the circumference of the log to be cut;
- two opposite oscillating cradles (218), each cradle supporting a pertaining strip and being pivotally fastened adjacent the support (207, 209) of the pertaining strip (212, 214);
- a pair of rods (228A, 228B), each rod being connected to a respective one of said oscillating cradles (218) in such a manner as to pivot the cradle in order to adapt its angular position to the diameter of the log being processed;

characterized by a common control means to simultaneously adjust the position of the adjustment holder (246) and the symmetrical angular orientation of the two rods (228A, 228B) and, consequently, of the cradles, said control means including: an angularly movable actuating member (240, 242); two rod members (236A, 236B) connected to respective eccentric pins (238A, 238B) located at diametrically opposite positions of said angularly movable actuating member (240, 242), said two rod members (236A, 236B) being connected each to a respective one of the two rods (228A, 228B) of the oscillating cradles (218) to achieve symmetrical and simultaneous angular positioning of said two rods (228A, 228B) and, consequently, of the cradles; and a drive (262, 264, 266) operatively associated with the actuating member (240, 242) to operate the adjustment holder (246) and thereby the strap (222) which surrounds the strips (212, 214).

2. A device according to Claim 1, characterized in that said drive (260, 262, 264) includes means for adjusting the mutual angular position between said actuating member (240, 242) and an angularly movable member (248) which carries the adjustment holder (246). 5
3. A device according to Claim 2, characterized in that it includes within said drive (260, 262, 264) an endless, flexible, member (262) to operate said angularly movable member (248) on which the strap (222) is partly wound and which carries the adjustment holder (246); and on each of the two opposite sections of said flexible member (262) a length adjusting member (270). 10 15
4. A log-cutting machine for cutting two parallel logs simultaneously, said machine including, for each log, a log advancing path, a clamping device according to any of the preceding Claims. 20
5. The log-cutting machine according to Claim 4, characterized in that it includes, for the two clamping devices associated to said two log advancing paths, two respective bars (232A, 232B), each one being articulated to one respective connecting rod member (236A, 236B), each bar being supported by at least two rods (228A, 228B) to be operated simultaneously and in the same direction by said actuating member (240, 242). 25 30
6. The log-cutting machine of Claim 4 or 5, characterized in that two straps (222) able to act on the two pairs of cooperating strips (212, 214) arranged side-by-side are coupled and engaged to the same adjusting holder (246) to be operated simultaneously. 35
7. A log-cutting machine including a cutting blade operating in a cutting plane and a clamping device for retaining the logs during cutting, characterized in that it includes a clamping device according to any one of claims 1 to 3. 40

Patentansprüche 45

1. Spannvorrichtung zum Halten eines Stammes in der Nähe der Schneidebene in einer Stammschneidmaschine, welche an Stämme unterschiedlichen Durchmessers während des Betriebs der Schneidmaschine schnell anpassbar ist und für jeden Stamm auf jeder Seite der Schneidebene, (T-T) aufweist: 50
 - ein paar nachgiebige gebogene Bänder (212, 214), von denen jedes ein erstes, an einem betreffenden Lager (207, 209) befestigtes Ende und ein zweites zugehöriges freies Ende 55

besitzt, und jedes Band zwischen seinem befestigten Ende und seinem freien Ende in solcher Weise gebogen ist, daß die Bänder zusammen einen Kanal definieren, durch welchen ein Stamm sich bewegen kann;

- einen Gurt (222), der teilweise die Bänder umgibt und sich um einen Abschnitt gegenüber den festen Enden der Bänder (212, 214) erstreckt, wobei ein Ende des Gurtes an einem Rückhalter verankert und das andere Ende des Gurtes an einem einstellbaren Halter befestigt ist, wobei der einstellbare Halter zum Anziehen bzw. Lockern des Gurtes beweglich ist, um die Geometrie der Bänder an den Durchmesser des in der Verarbeitung befindlichen Stammes anzupassen, und wobei der Gurt (222) sich um etwa die Hälfte des Umfangs des zu schneidenden Stammes erstreckt;
 - zwei gegenüberliegende oszillierende Schwenklager (218), wobei jedes Schwenklager ein betreffendes Band trägt und neben dem Lager (207, 209) des betreffenden Bandes (212, 214) schwenkbar angelenkt ist;
 - ein paar Stangen (228A, 228B), wobei jede Stange mit einem zugehörigen Schwenklager (218) in solcher Weise verbunden ist, daß das Lager schwenken kann um seine verbunden ist, daß das Lager schwenken kann um seine Winkelstellung an den Durchmesser des zu bearbeitenden Stammes anzupassen; gekennzeichnet durch eine gemeinsame Steuereinrichtung, um die Position des einstellbaren Halters (246) und die symmetrische Winkellagerung der beiden Stangen (228A, 228B) und folglich der Schwenklager gleichzeitig einzustellen, wobei die Steuereinrichtung aufweist: ein winkelmäßig bewegbares Betätigungsteil (240, 242); zwei Stangenteile (236A, 236B), die jeweils mit exzentrischen Bolzen (238A, 238B) verbunden sind, welche an diametral gegenüberliegenden Positionen des winkelmäßig bewegbaren Betätigungsteils (240, 242) lokalisiert sind, wobei jedes der beiden Stangenteile (236A, 236B) mit einer zugehörigen der beiden Stangen (228A, 228B) der Schwenklager (218) verbunden sind, um ein symmetrisches und gleichzeitiges Winkel-Positionieren der beiden Stangen (228A, 228B) und folglich der Schwenklager zu erreichen; und durch einen wirkungsmäßig den Betätigungsteilen (240, 242) zugeordneten Antrieb (262, 264, 266) um den einstellbaren Halter (246) und dadurch den die Bänder (212, 214) umgebenden Gurt (222) anzutreiben.
2. Vorrichtung nach Anspruch 1 dadurch gekennzeichnet, daß der Antrieb (260, 262, 264) Mittel zum Einstellen der gegenseitigen Winkelposition

zwischen dem Betätigungsteil (240, 242) und einem winkelmäßig beweglichen Teil (248), welches den einstellbaren Halter (246) trägt, aufweist.

3. Vorrichtung nach Anspruch 2 dadurch gekennzeichnet, daß in dem Antrieb (260, 262, 264) ein endloses, flexibles Bauteil (262) vorgesehen ist, um das winkelmäßig bewegliche Bauteil (248), um welches der Gurt (222) teilweise herumgelegt ist, und das den einstellbaren Halter (246) trägt, anzutreiben; und daß der Antrieb auf jedem der beiden gegenüberliegenden Abschnitte des flexiblen Bauteils (262) ein Längeneinstellteil (270) aufweist. 5
4. Stammschneidmaschine zum gleichzeitigen Schneiden zweier paralleler Stämme, welche für jeden Stamm einen Stammvorschubweg sowie eine Spannvorrichtung nach einem der vorstehenden Ansprüchen aufweist. 10
5. Stammschneidmaschine nach Anspruch 4 dadurch gekennzeichnet, daß sie für die beiden den beiden Stammvorschubwegen zugeordneten Spannvorrichtungen zwei zugehörige Balken (232A, 232B) aufweist, von denen jeder an einer zugehörigen Verbindungsstange (236A, 236B) angelenkt ist und jeder Balken durch wenigstens zwei Stangen (228A, 228B) getragen ist, um gleichzeitig und in der gleichen Richtung durch das Betätigungsteil (240, 242) angetrieben zu werden. 20
6. Stammschneidmaschine nach Anspruch 4 oder 5 dadurch gekennzeichnet, daß zwei Gurte (222) imstande sind, auf zwei Paare von zusammenwirkenden und nebeneinander angeordneten Bänder (212, 214) einzuwirken, gekoppelt und an dem gleichen einstellbaren Halter (246) vorgesehen sind um gleichzeitig angetrieben zu werden. 25
7. Stammschneidmaschine mit einem in einer Schneidebene arbeitenden Schneidmesser und mit einer Spannvorrichtung zum Halten von Stämmen während des Schneidens, dadurch gekennzeichnet, daß sie eine Spannvorrichtung nach einem der Ansprüche 1 - 3 aufweist. 40

Revendications

1. Dispositif de serrage pour le maintien d'un rouleau adjacent à un plan de coupe dans une machine à découper des rouleaux, le dispositif de serrage étant rapidement adaptable à des rouleaux de différents diamètres pendant le fonctionnement de la machine de coupe, le dispositif de serrage comprenant pour chaque rouleau et de chaque côté du plan de coupe (T-T): 50

- une paire de bandes arquées flexibles

(212,214) ayant chacune une première extrémité fixée à un support respectif (207,209) et, respectivement, une deuxième extrémité libre, chaque bande étant courbée entre son extrémité fixe et son extrémité libre de telle façon que les bandes définissent ensemble un passage à travers lequel un rouleau peut se déplacer ;

- une courroie (222) entourant partiellement les bandes et s'étendant autour d'une partie de celles-ci à l'opposée des extrémités fixes des bandes (212,214), une extrémité de la courroie étant ancrée à un support de maintien, l'autre extrémité de la courroie étant fixée à un support d'ajustement, le support d'ajustement étant déplaçable pour resserrer, respectivement relâcher, la courroie afin d'adapter la géométrie des bandes au diamètre du rouleau en cours de traitement, la courroie (222) s'étendant autour d'approximativement la moitié de la circonférence du rouleau à découper ;
- deux berceaux opposés oscillants (218), chaque berceau supportant une bande respective et étant assujetti en pivotement de façon adjacente au support (207,209) de la bande respective (212,214) ;
- une paire de tiges (228A,228B), chaque tige étant reliée à l'un respectif des berceaux oscillants (218) de telle façon à pouvoir faire pivoter le berceau pour adapter sa position angulaire au diamètre du rouleau en cours de traitement ;

caractérisé par des moyens de contrôle communs qui ajustent simultanément la position du support d'ajustement (246) et l'orientation angulaire symétrique des deux tiges (228A,228B) et, en conséquence, des berceaux, ces moyens de contrôle comprenant : un organe de commande déplaçable angulairement (240,242) ; deux organes en forme de tige (236A,236B) reliés à deux chevilles respectives excentriques (238A,238B) placées dans des positions diamétrales opposées sur l'organe de commande déplaçable angulairement (240,242), les deux organes en forme de tige (236A,236B) étant reliés chacun à l'une respective des deux tiges (228A,228B) des berceaux oscillants (218) pour permettre le positionnement angulaire symétrique et simultané des deux tiges (228A,228B) et, en conséquence, des deux berceaux ; et un entraînement (262,264,266), associé fonctionnellement à l'organe de commande (240,242) pour actionner le support d'ajustement (246) et ainsi la courroie (222) qui entoure les bandes (212,214).

2. Dispositif selon la revendication 1, caractérisé en

ce que l'entraînement (260,262,264) comprend des moyens pour ajuster la position angulaire mutuelle entre l'organe de commande (240,242) et un organe déplaçable angulairement (248) qui porte le support d'ajustement (246).

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3. Dispositif selon la revendication 2, caractérisé en ce qu'il comprend à l'intérieur de l'entraînement (260,262,264) un organe flexible sans fin (262) qui actionne angulairement l'organe déplaçable (248) sur lequel la courroie (222) est partiellement enroulée et qui porte le support d'ajustement (246), et sur chacune des deux sections opposées de l'organe flexible (262), un organe pour ajuster la longueur (270).
4. Machine à découper des rouleaux pour couper deux rouleaux parallèles simultanément, la machine comprenant, pour chaque rouleau, un chemin pour avancer les rouleaux et un dispositif de serrage selon l'une des revendications précédentes.
5. Machine à découper des rouleaux selon la revendication 4, caractérisée en ce qu'elle comprend, pour les deux dispositifs de serrage associés avec les deux chemins pour avancer les rouleaux, deux barres respectives (232A,232B), chacune étant articulée sur un organe de liaison respectif en forme de tige (236A,236B), chaque barre étant supportée par au moins deux tiges (228A,228B) de façon à pouvoir fonctionner simultanément et dans la même direction sous l'action de l'organe de commande (240,242).
6. Machine à découper des rouleaux selon la revendication 4 ou 5, caractérisée en ce que les deux courroies (222) capables d'agir sur les deux paires de bandes qui coopèrent (212,214) arrangées côte-à-côte, sont couplées et engagées dans le même support d'ajustement (246) pour fonctionner simultanément.
7. Machine à découper des rouleaux comprenant une lame de coupe fonctionnant dans un plan de coupe et un dispositif de serrage pour retenir les rouleaux durant la coupe, caractérisée en ce qu'elle comprend un dispositif de serrage selon l'une des revendications 1 à 3.

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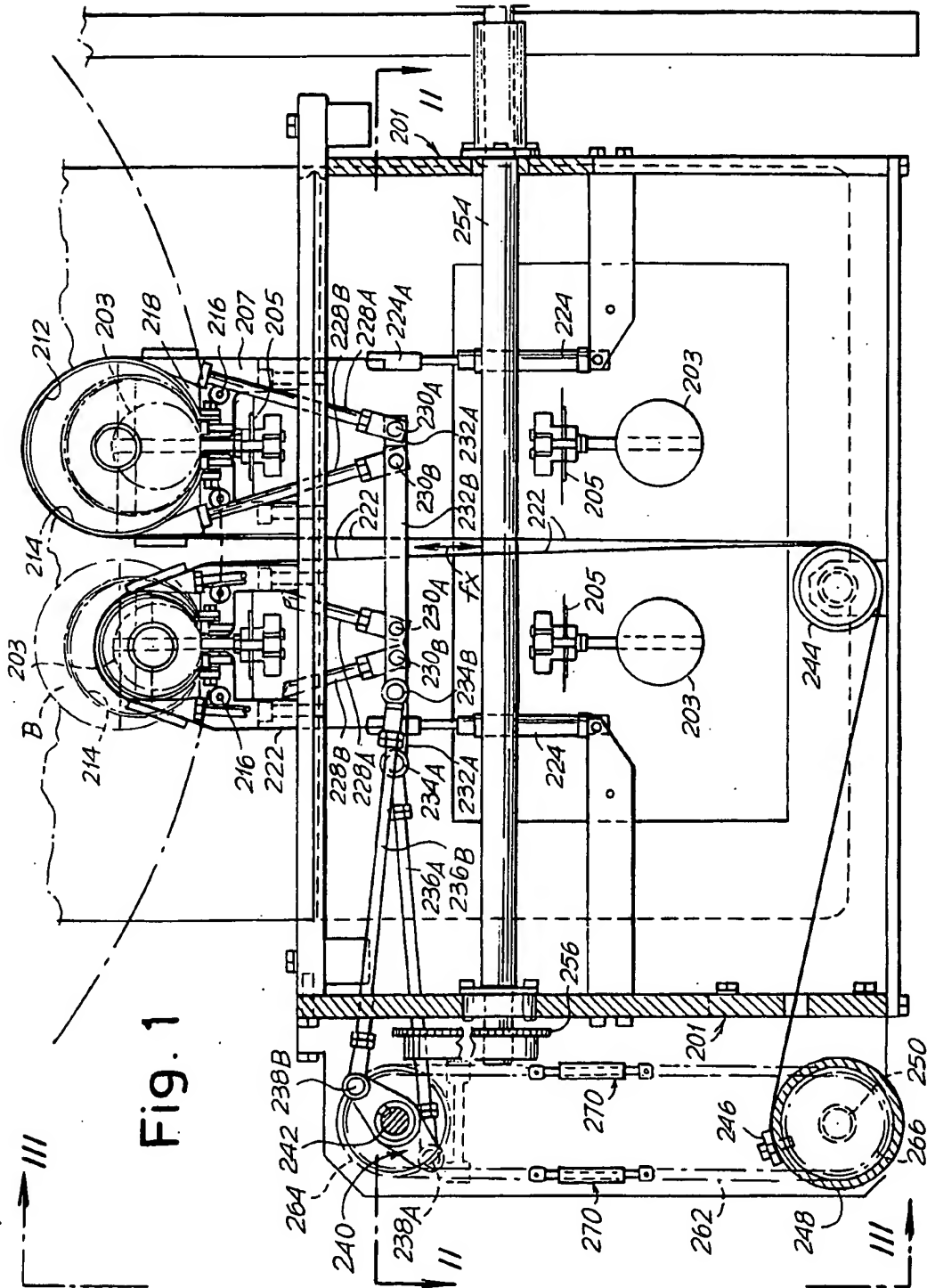


Fig. 1

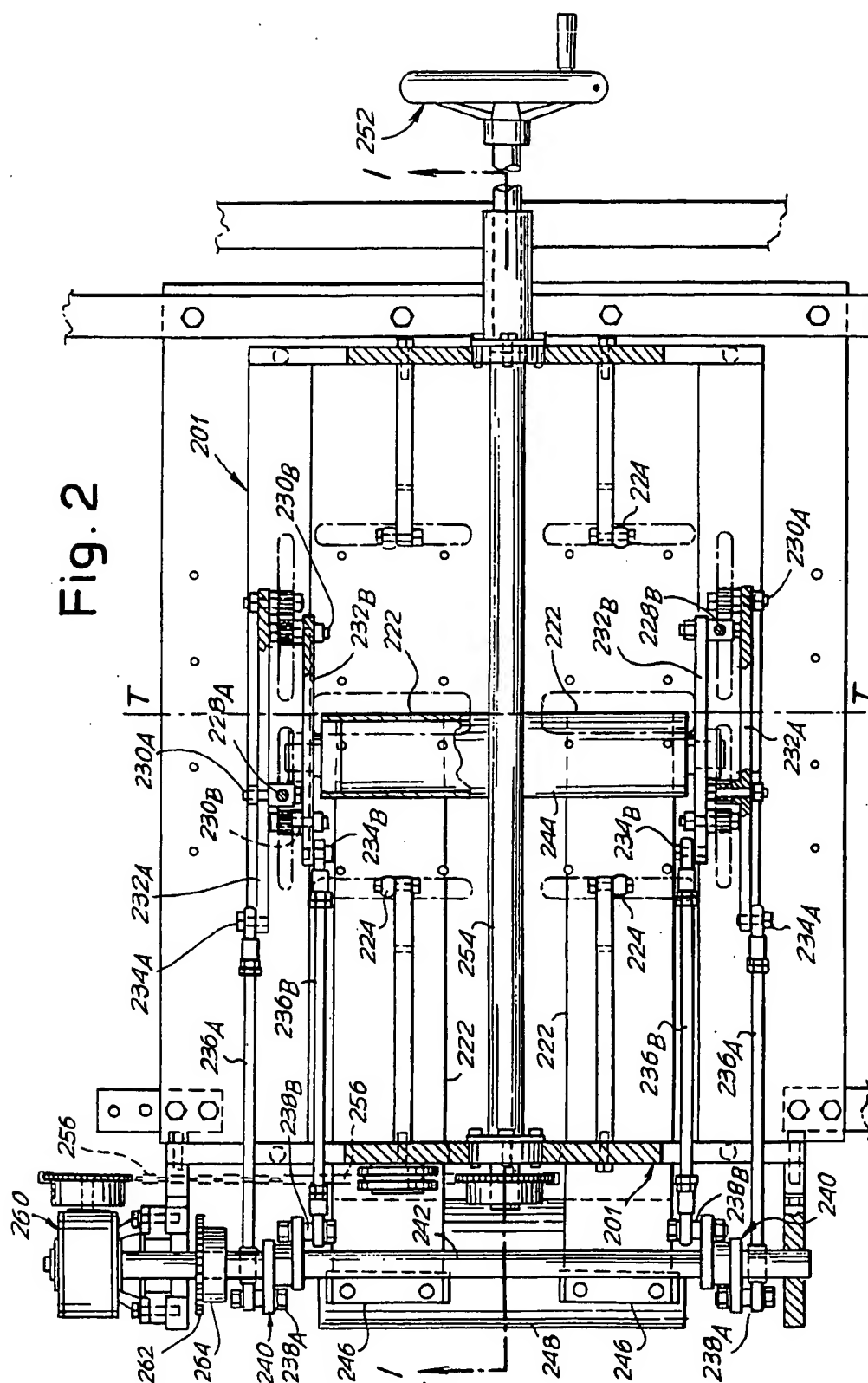


Fig. 3

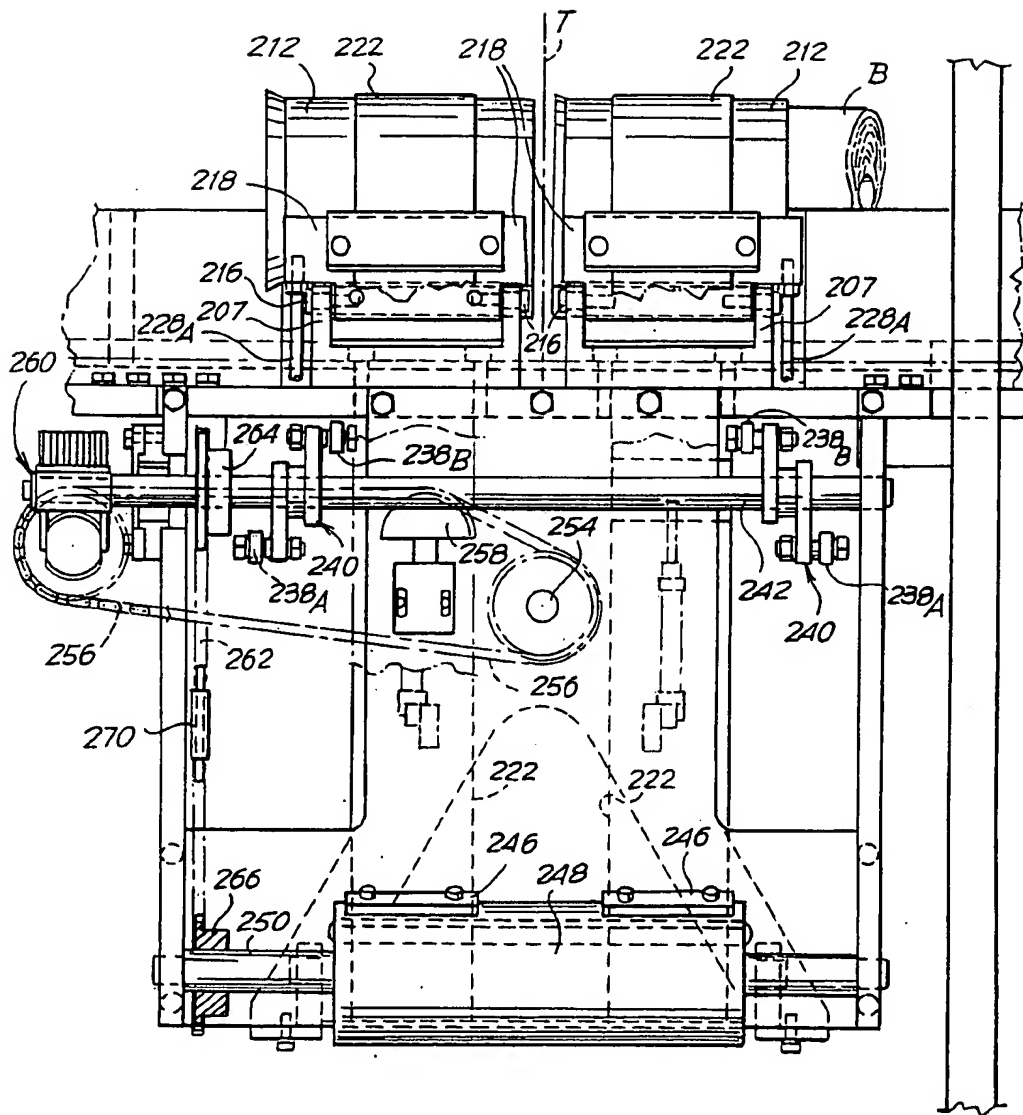


Fig. 4

